1.1.1 Structure and function of the processor		June17	June18	June19
a) The Arithmetic and Logic Unit; ALU, Control Unit and Registers (Program Counter; PC, Accumulator; ACC, Memory Address Register; MAR, Memory Data Register; MDR, Current Instruction Register; CIR). Buses: data, address and control: How this relates to assembly language programs.	**S1Q5d**		**Q1bii**	**
June 11 f451 Q7 A processor contains a number of special registers and buses. a) Describe the purpose of the following special registers: (i) Memory Data Register (MDR) [2] (ii) Current Instruction Register (CIR) [2] (iii) Accumulator [2] b) Describe the uses of different types of bus in the processor [4]				
b) The fetch-decode-execute cycle, including its effect on registers.				***
June 10 Q3 F453 **(a)** One feature of Von Neumann architecture is the use of the fetch-execute cycle. State **two** other features of Von Neumann architecture. **[2]** **(b)** The program counter is one register used by the processor. Give the names of **three** other registers used by the processor. (Do not use abbreviations).. **[3]** **(c) (i)** Describe the fetch-execute cycle. ..... **[4]** **(ii)** Describe how a jump instruction is executed. **[2]** **(d)** In some computer systems, a co-processor may be used. Explain the term co-processor. ..... **[3]**				
c) The factors affecting the performance of the CPU, clock speed, number of cores, cache.	**S2Q12***	**Q1aiii**	**Q1a**	
d) The use of pipelining in a processor to improve efficiency	**S1Q5efg** **S2Q3c**	**Q1aiii**		***
How is pipelining used to improve efficiency in a processor? Pipelining allows the processor to perform the fetch-decode-execute stages independently so that the next instruction does not have to wait for the previous instruction to be decoded and executed before fetching the next. So while instruction 1 is being				

decoded, instruction 2 can be fetched. When instruction 1 is being executed, instruction 2 is being decoded and instruction 3 is fetched, and so on. The cpu thus works like a production line and this improves throughput and hence cpu performance.				
e) Von Neumann, Harvard and contemporary processor architecture.			**Q1aV N**	
1.1.2 Types of processor				
a) The differences between, and uses of, CISC and RISC processors.			**Q2biii**	
Compare a CISC and a RISC processor **CISC**: Each instruction may take multiple cycles; Single register set; Instructions have variable format; Many instructions are available; Many addressing modes are available; Complicated processor design; Integrated circuit is expensive; Used in desktops/laptops **RISC:** An instruction performs a simple task; Limited number of instructions available; Complex tasks can only be performed by combining multiple instructions; Simple processor design. Programs run faster… due to simpler instructions compared to a CISC processor; used in smartphones and tablets.				
b) GPUs and their uses (including those not related to graphics)	**S2Q12***	**Q1ai**		
c) Multicore and parallel systems.	**S2Q12***			***
1.1.3 Input, output and storage				
a) How different input output and storage devices can be applied as a solution of different problems.	**S2Q2**		**Q5a**	
June 11 f451 Q1 a) State what is meant by (i) An input device [1] (ii) An output device [1] b) A central heating system is used to control the heating in a house. (i) State an automatic input device which would be used with this system,				

explaining why it is necessary [2]. (ii) State an automatic output device which would be used with this system, explaining why it is necessary [2].				
b) The uses of magnetic, flash and optical storage devices.	**S1Q2***			***
June11 Q9 F541 A Computer programmer works from home 4 days a week for a large software house. On Fridays she goes into the offices of the company in order to deliver any sensitive material personally and to meet with the rest of her team of programmers. a) Describe two different types of storage devices that she would use, making it clear how she would use them [6] b) The programmer used to go to the office every day and work there. State an advantage and a disadvantage of each of: (i) The programmer (ii) The software house (iii) Society [6]				
c) RAM and ROM.	**S1Q1b**	**Q1aii**		
d) Virtual storage. Now referred to as cloud storage. Or abstraction of physical to logical storage. Consider a college network, you might think the Student group shared area is a single device with subfolders for various departments, subjects, etc. It may actually be on several different devices and locations				**
1) A school has decided to replace their file servers with virtual storage. a) Explain what the term virtual storage means. [2] b) Explain two advantages to the school of using virtual storage. [4] c) Explain the difference between virtual storage and secondary storage. [2]				
a) Collects multiple physical storage devices together… combines as a single logical drive. Storage devices may be different types / vendors. … they can be managed through a central system. b) Combine new and old hardware together – Reduce the cost of upgrading the storage / no need to replace old hardware if it is still functional.				

Centrally manage all hardware – Different vendors use different management system / talking to hardware is virtualised. c) Secondary storage refers to a single device. Virtual storage combines multiple disparate devices together.					
1.2.1 Operating Systems					
a) The need for, function and purpose of operating systems.	**S1Q10a**		**Q2ai**		
b) Memory management (paging, segmentation a virtual memory).	**S1Q1dc S2Q1a(i)**	**Q1bi**	**Q2aii +**		
c) Interrupts, the role of interrupts and Interrupt Service Routines (ISR), role within the fetch decode execute cycle.	**S1Q10c S2Q1b**			***	
1) A new mouse has been connected to a computer and the device driver installed into the operating system. a. Explain the role of a device driver. [2] b. Explain what an interrupt is. [2] c. State two other interrupts that could occur. [2] 2) Describe how interrupt service routines are used in an operating system. [4]	1a) Translates generic calls from the operating system into signals the device will understand. 1b) An electric signal is sent to the CPU to inform that an event has happened. Can be triggered by software / (user interrupt). 1c) Timer, Hardware switch; Storage device 2) An interrupt is sent to the CPU; Set as a bit in the interrupt register; At the end of the / beginning of the FDE cycle ; Priority of the interrupt is tested against the current process. If it is higher then the current process is saved (cpu register contents) on the stack and the ISR is run.				
d) Scheduling: round robin, first come first served, multi-level feedback queues, shortest job first and shortest remaining time.				***	
June10 Q1 f453 a) What is scheduling? describe one method of scheduling					

e) Distributed, embedded, multi-tasking, multi-user and real time operating systems.		**Q1b mt**	**7a RT**		
June 11 f451 Q9 a) Describe each of the following types of Operating System and give an example of where each could be used (i) Multi-tasking and where it could be used [4] (ii) Multi=user and where it could be used [4] b) (i) State what is meant by utility software [1] (II) A student uses a computer to produce coursework for a number of subjects. Explain how the student could use file handling utilities with the computer [3]					
f) BIOS. (BIOS – stand for the Basic Input Output System. It is the boot-up program that is run when the computer is first switch on. The initial start-up instructions are stored in ROM and the BIOS settings are stored in flash memory memory so that they can be changed and are retained when the power is switched off. When the computer is switched on, a poer on self test (POST) checks that the hardware is installed (processor, memory, hard-disk, etc). If all is well then the bootstrap or boot loader program loads the operating system into memory and then passes control over to the operating system.)				**	
g) Device drivers. (Purpose: Translates generic calls from the operating system into signals the device will understand.)				**	
h) Virtual machines, any instance where software is used to take on the function of a machine including executing intermediate code or running an OS within another.	**S1Q10b**			***	
A Virtual Machine is Software used to emulate a machine. Can be used for running one OS inside another to emulate different hardware A virtual machine can execute intermediate code e.g. Java virtual machine executes Java byte code The MAME virtual machine can emulate the hardware of old arcade machines so that their games can be played on a modern PC					
1.2.2 Applications generation					

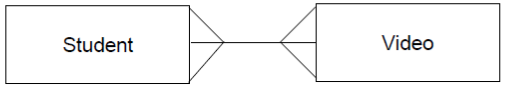
<table>
<tr><td>a) The nature of applications, justifying suitable applications for a specific purpose.</td><td></td><td></td><td></td><td>*</td><td></td></tr>
<tr><td>b) Utilities.
Utility programs optimise the performance of the computer (maintenance) and perform useful background tasks E.g. Disk Defragmenter, backup software, virus checkers, compression software</td><td>S1Q1a</td><td></td><td></td><td>***</td><td></td></tr>
<tr><td>c) Open source vs Closed source.
Open source software allows anyone to access its source code; The software is open source licensed but free to use; Anyone may modify the software and sell it, on the condition that the software produced is also open source; freeware - software that is free for anyone to use but the source code is not available
Closed source (proprietary)
Closed source (or ‘proprietary’) software does not allow access to source code. Users must pay the person or company owning the copyright for a license to use the software. There may be restrictions on how the software is used, e.g. it may only be licensed to be used by one person, on one machine, or on a particular physical site</td><td></td><td></td><td>Q5c</td><td></td><td></td></tr>
<tr><td>d) Translators: interpreters, compilers and assemblers.</td><td>S2Q3b</td><td></td><td></td><td>***</td><td></td></tr>
<tr><td>e) Stages of compilation (lexical analysis, syntax analysis, code generation and optimisation).</td><td></td><td>*10d(ii)</td><td></td><td></td><td></td></tr>
<tr><td>June11 Q2 f453
a) Software is used to convert source code into object code.
(I) Name this type of software [1]
(II) Explain the term source code [4]
b) Complete the table with ticks to show at which stage, if any, events occur when a compiler is use.
[6]
<table>
<tr><td></td><td>Lexical Analysis</td><td>Syntax Analysis</td><td>Code Generation</td><td>Not during compilation</td></tr>
<tr><td>Optimisation occurs</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Logical errors detected</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Tokens are created</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Spaces are removed</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Comments are removed</td><td></td><td></td><td></td><td></td></tr>
</table></td><td></td><td></td><td></td><td></td></tr>
</table>

	Incorrect punctuation detected								
c) *When producing programs, library routines may be used. Explain why library routines help programmers and describe how library routines are used [8]									
f) Linkers and loaders and use of libraries							**10d libs**		
1.2.3 Software Development									
a) Understand the waterfall lifecycle, agile methodologies, extreme programming, the spiral model and rapid application on development.						**S1Q10d**	**Q10a, b**		
June 11 f451 Q6 A systems analyst has been in charge of creating an automated production line in a factory. a) The analyst followed the stages of the systems life cycle. Describe the purpose of three (3) of the stages of the systems life cycle which the Analyst must follow before the software can be written. [6] b) The Analyst uses the Waterfall Model of the systems life cycle. Describe the waterfall model [3] c) Explain the importance of evaluating the system and the criteria that should be used in the evaluation [4]. d) Describe two (2) types of maintenance that could be carried out on the finished system [4]									
b) Relative merits and drawbacks of different methodologies & when they might be used								***	

June 11 f452 Q2a A company is producing a computer program for a new cash point. The company uses Rapid Application Development (RAD). a) Describe what is meant by RAD and how it could be used to help in producing the program. [4] Sample h446-01 Q1d **(d)*** The software team that produces De-Duplicator decides to make a new version that can detect duplicated images the previous version could not. The software team must decide which methodology they will use for the project. Some members of the team suggest extreme programming whilst others would prefer to use the waterfall lifecycle. Discuss the **two** methodologies **and** justify which you would recommend. [8]					
c) Writing and following algorithms.	**S2Q4bc**	**Q7e,10b**	**Q1biii**		
1.2.4 Types of Programming Languages					
a) Need for and characteristics of a variety of programming paradigms.			***Q1biv**		
b) Procedural languages.				***	
What is procedural programming? Procedural programming is where programs are executed line by line and are designed with a top-down view. From the top-down view, the program is separated and written with routines (called procedures) where each procedure performs a specific task. The term “structured programming” encompasses procedural programming, event-driven programming and object oriented programming. In terms of abstraction, why was structured programming developed? Structure programming was developed as a way of providing a level of abstraction away from the operations of the computer (i.e. internal memory addresses and hardware operations) to make code shorter and far easier for humans to understand.					
c) Assembly language (including following and writing simple programs with the Little Man Computer instruction on set). See appendix 5e.	**S1Q5** **S2Q3**	**Q5a, b**	**Q1bi**		
d) Modes of addressing memory (immediate, direct, indirect and indexed)	**S1Q5b**			***	

	S2Q3				
e) Object-oriented languages (see appendix 5e for pseudocode style) with an understanding of classes, objects, methods, attributes, inheritance, encapsulation on and polymorphism.	**S1Q10e* S2Q2bc d S2Q7d**		**Q7bc**		

Sample h446-1 Q4
4 Livid Lizards is a computer game in which players get to fire lizards from a cannon to knock down walls. Players get to pick different types of lizards, each with qualities and special powers.
The game is coded using an object-oriented language. Below is the code for the lizard class:
`class Lizard`
`  private speed`
`  private mass`
`  private size`
`  public procedure new(givenSpeed, givenMass, givenSize)`
`  speed=givenSpeed`
`  mass=givenMass`
`  size=givenSize`
`  endprocedure`
`  public function breakBlock(brick)`
`  if speed*mass>=brick.getStrength() then`
`  speed=((speed*mass)-brick.getStrength())/`
`  mass;`
`  return true`
`  else`
`  return false`
`  endif`
`  endfunction`
`endclass`
 	
(a) Lizard is a class. Describe what is meant by a class. [**2]**
(b) Identify an attribute in the Lizard class. **[1]**
(c)
(i) Describe what is meant by the term *inheritance*. [3]
(ii) Explain **one** way the game's developers might use inheritance for					

Livid Lizards. [3] **(d)** The game uses a 2D graphics library. Explain why a linker would need to be used after compilation. [3]					
1.3.1 Compression, Encryption and Hashing					
a) Lossy v lossless compression		**Q3a**			
b) Run Length encoding and dictionary coding for lossless compression		***Q3b**			
c) Symmetric and asymmetric encryption	**S2Q6c**	**Q4c**	**8bcd***		
d) Different uses of hashing	**S2Q8f**	**Q7b**			
1.3.2 Databases					
a) Relational database, flat file, primary key, foreign key, secondary key, entity relationship modelling, normalisation and indexing. See appendix 5g	**S1Q8ab**	**Q7a** **PK**	**Q3c** **PK, SK**		
Sample h446-1 **(c)** The exam board wants to use a database to keep track of which videos each student has viewed. The structure it plans to use is shown below:  **(i)** Identify **one** reason why this structure would not be suitable. **[1]** **(ii)** Draw a new version of the structure to solve this problem. **[3]** **(d)** The video table consists of following fields: VideoID, VideoName, Presenter, Topic. **(i)** Describe what is meant by the term *primary key*. **[2]** **(ii)** Write an SQL query that finds the name and presenter of all videos on the Topic of "The CPU". [**4]**					
b) Methods for capturing, selecting, managing and exchanging data.			**Q3e**		
c) Normalisation to 3NF.	**S1Q8c** **S2Q5**		**Q3d**		

d) SQL – Interpret and modify. See appendix 5e.	**S1Q8d S2Q8d-h**	**Q7c,d**	**Q3ab**		
e) Referential integrity	**S1Q8d S2Q5c***			***	
Referential Integrity is a rule that states that a value cannot be entered in a foreign key if the corresponding value does not exist in the primary key field of the corresponding table. If the school IDs in the primary table are 1,2,3 we cannot put a school ID of 7 in the foreign key field because it would be referring to an orphan (non-existent) value in the Primary table.					
f) Transaction processing, ACID (Atomicity, Consistency, Isolation, Durability), record locking and redundancy.	**S2Q5c***			***	

Transaction processing

In the context of databases, a single logical operation is defined as a transaction. It may consist of several operations; for example, a customer order may consist of several order lines…

all of which must be processed…

the quantity of each product adjusted on the stock file…

credit card details checked…

payment accepted or rejected

What happens if the stock file has been updated and the system crashes before the payment is processed?

ACID

ACID stands for Atomicity, Consistency, Isolation, Durability

This is a set of properties to ensure that the integrity of the database is maintained under all circumstances

It guarantees that transactions are processed reliably

Atomicity

This property requires that a transaction is processed in its entirety or not at all

In any situation, including power cuts or hard disk crashes, it is not possible to process only part of a transaction

Consistency

This property ensures that no transaction can violate any of the defined validation rules. Referential integrity, specified when the database is set up, will always be upheld

Isolation

The Isolation property ensures that concurrent execution of transactions leads to the same result as if transactions were

processed one after the other This is crucial in a multi-user database **Durability** This ensures that once a transaction has been committed, it will remain so, even in the event of a power cut As each part of a transaction is completed, it is held in a buffer on disk until all elements of the transaction are completed Only then will the changes to the database tables be made					
1.3.3 Networks					
a) Characteristics of networks and the importance of protocols and standards.			**4b**		
June 2011 f451 Q8 Data is communicated between devices in a network. a) A protocol is needed in a network. State what is meant by a protocol [2] b) Describe three parts of a protocol that would enable communication to take place [6] c) Describe packet switching to send data from one device to another in the network [5]					
b) Internet structure: • The TCP/IP Stack. DNS . Protocol layering. LANs and WANs. • Packet and circuit switching.	**S2Q8e**		**4a** wan 4b tcp/ip		
Sample h446-01 **9** Zuhair wants to create a Local Area Network (LAN) for himself and his family, in his home. **(a)** Describe what is meant by a LAN. **[2]** **(b)** TCP/IP uses packet switching. Explain what is meant by packet switching. **[4]**					
c) Network security and threats, use of firewalls, proxies and encryption		**Q1cii fw**			
d) Network hardware				***	

Wireless components: Wireless Network Interface Card (NIC); A station consists of a computer and an NIC; Stations share a radio frequency channel

Wireless Access Point (WAP) requires a connection to a router, and the router requires a connection to a modem

The WAP and the modem are often built into the router

Network interface card (NIC) -this allows the device to be physically connected to the network and allows communication to pass to and from a computer. It contains a unique identifier called the MAC address.

Hub- is a concentrator that connects lots of computers to the network through a single link. Signals received on any port are broadcast to all other ports.

Switch- a switch has a number of ports and it stores the addresses of all devices that are directly or indirectly connected to each port. As data comes into the switch, it is examined to see the final destination and then directed to the port to which the device it is seeking is connected.

Router- this is a device that routes information between networks. It can select the best path to route a message, as well as translate information from one network to another. It can connect a LAN to a WAN

Gateways - A gateway is required where data is travelling from one network to another that use different protocols

Networks using different transmission media can require this

Header data are removed and reapplied using the correct format of the new network

A router and gateway can often be combined into one integrated device

Server- there are different kinds of server: File server, Proxy server, applications server, email server, printer server, Backup server, etc.

File server: stores documents and resources and allows access to those by computer and user.

Proxy server: verifies and routes requests and bans those that are not permitted

Applications server: stores and distributes programs to users, keeps quotas of instances of applications running to ensure licence agreements are not broken.; **Print server:** controls printing, including quotas; **Email server:** routes email as well as holds email and email accounts.

e) Client-server and Peer to peer.		**Q1ci**			
1.3.3 Web Technologies					
a) HTML, CSS and JavaScript.	**S1Q6,11 S2Q8**	**Q9a,b,c**	**Q2bi**		
b) Search engine indexing			**Q2bii**		

c) PageRank algorithm	**S1Q11e**			***	

PageRank was developed to list search results in the order and rank of usefulness and relevance

PageRank Algorithm

The original PageRank algorithm is:

PR(A) = (1-d) + d (PR(Ti)/C(Ti) + … + PR(Tn)/C(Tn))

PR(A) is the PageRank of page A
PR(Ti) is the PageRank of pages Ti which link to page A
d is the damping factor
C(Ti) is the number of outbound links on page Ti
The algorithm does not rank websites as a whole; Each web page has its own PageRank
The PageRank of page A is defined by the PageRanks of those pages linked to page A
The damping factor (**d**) is the probability of a random web browser reaching a page. This value is usually set to 0.85
The importance of a web page is determined by the number of inbound links from other pages

d) Server and client side processing	**S2Q8c**			***	

Client vs server side processing

Client Processing	Server Processing
1. Initial validation	1. Database queries
2. Web page interactivity	2. Encoding data to readable HTML
3. Manipulating interface elements	3. Updating the database
4. Applying styles (CSS)	4. Calculations
5. Reduces the load on the server	5. Provides further validation
6. Reduces the amount of web traffic	6. Keeps data owned by organisations secure

1.4.1 Data Types					
a) Primitive data types, integer, real/floating point, character, string and Boolean.				***	
b) Represent positive integers in binary.		**Q6ai**			

c) Use of sign and magnitude and two's complement to represent negative numbers in binary.	**S1Q3e S2Q11b**	**Q6b**			
d) Addition and subtraction of binary integers.			**9ab**		
e) Represent positive integers in hexadecimal.	**S2Q11a**	**Q6aii**			
f) Convert positive integers between Binary Hexadecimal and denary.	**S1Q3a**	**Q6aii**	**9c, d**		
g) Representation and normalisation of floating point numbers in binary	**S2Q11c**	**Q6d**	**9e**		
h) Floating point arithmetic, positive and negative numbers, addition and subtraction	**S1Q3f S2Q11d**	**Q6d su**			
i) Bitwise manipulation and masks: shifts, combining with AND, OR and XOR	**S1Q3bc d S2Q6a**	**Q6c**	**9f,g**		
j) How character sets (ASCII and UNICODE) are used to represent text.	**S1Q4**		**8a asc**		
June 11 f451 Q4ab A car insurance firm collects data from its customers and stores it in a computer system. a) The customer's name is stored using the computer's character set. (i) Explain what is meant by the character set of computer [2] (ii) Explain the use of code to represent a character set [2] b) When data is input, it must be verified and validated. (i) When the details of the customer are input into the system, the data must be verified. Describe one way that the data entered can be verified [2] (ii) One piece of data that is required is the make of the car. An existence check and a presence check will be carried out on this data. Describe what is meant by an existence check [1]. Describe what is meant by a presence check [1] c) *Explain the need for the firm to back up and archive the customer data and the procedures for carrying out these processes. [8]					

1.4.2 Data Structures					
a) Arrays (of up to 3 dimensions), records, lists, tuples.	**S2Q4abc**	**Q2b rec**			
b) The following structures to store data: linked-list, graph (directed and undirected), stack, queue, tree, binary search tree, hash table.	**S2Q7abc**	**Q2a LL; Q2b HT; Q10cST**	**Q5b**		
C) How to create, traverse, add data to and remove data from the data structures mentioned above. (NB this can be either using arrays and procedural programming or an object-oriented			**Q5b**		
1.4.3 Boolean Algebra					
a) Define problems using Boolean logic.		**Q4a**			
b) Manipulate Boolean expressions, including use of Karnaugh maps to simplify Boolean expressions.	**S2Q9a**	**11b**	**10b**		
c) Use the following rules to derive or simplify statements in Boolean algebra: De Morgan's laws. Distribution, association, commutation, double negation.	**S2Q9b**	**Q4b**			
d) Use logic gate diagrams and truth tables.	**S1Q7ab S2Q10**	**Q4b,11a**	**10a**		
e) The logic associated with D type flip flops, half and full adders	**S2Q10bc**	**11a**			
1.5.1 Computing related legislation					
a) The Data Protection Act 1998.	**S1Q8d S1Q9***			***	

The Data Protection Act (1998) **To protect members of the public (you and I) from the misuse of personal data held about them.** **Personal data means data that relates to a living, identifiable person (name, address, health/education, etc)** **Processing includes obtaining, recording, sorting, searching, editing; passing it on; destroying it;** **The Data Subject is the living identifiable human being about whom the data is being held.** **The Data Controller is the individual in the company who is responsible for making sure the act is obeyed.** **The Information Commissioner is the person in the country who ensures the act is being adhered to.** **Principles: 1) Personal data must be processed fairly and lawfully;** **2)Personal data shall be obtained only for one or more specified purposes, and not used for any other purpose;** **3)Personal data shall be adequate, relevant and not excessive;** **4) Data shall be accurate and up to date;** **5) Data shall not be kept for longer than necessary;** **6)Data shall be processed in accordance with the rights of the subject;** **7)Data shall be kept secure;** **8)Data shall not be transferred to a country outside the EEA, unless that country has an equivalent act.** **Subject rights: 1)Right to subject access; 2)Right to prevent processing likely to cause damage or distress; 3)Right to prevent processing for the purposes of direct marketing; 4)Right to stop automated decision making; 5)Right to compensation if damage and distress is suffered by the Act being broken; 6)Right to rectify, block or erase incorrect data.** **Exemptions: National security; Crime and Taxation; Health, Education and Social work; Domestic purposes**					
b) The Computer Misuse Act 1990.				***	
The Computer Misuse Act (1990) **Prevention of hacking.** **Its an offence: 1) unauthorised access to computer material; hacking; 6months jail and/or up to £2000 fine** **2) unauthorised access with intent to commit or facilitate the commission of further (other) offences.5yrs jail** **3) Unauthorised modification of computer material. (making changes, deleting, corrupting; 5yrs jail)** **4) Making, supplying or obtaining articles for use in computer misuse offences** **Main provisions (4) as above. Benefits: legal recourse; Problems (intent has to be proven; finding out who is responsible;etc);**					
c) The Copyright Design and Patents Act 1988.				***	
d) The Regulation of Investigatory Powers Act 2000.	**S1Q9***			***	

1.5.2 Ethical, moral and cultural issues					
a) The individual (moral), social (ethical) and cultural opportunities & risks of digital technology: • Computers in the workforce ; Automated decision making • Artificial intelligence; Environmental effects • Censorship and the Internet; Monitor behavior • Analyse personal information; Piracy and offensive communications • Layout, colour paradigms and character sets.		***Q8 AI**	***Q6** **7d** **8d***		
June 2011 f451 Q5 A supermarket stores data about customers who have loyalty cards. a) Explain why some customers may be concerned about giving their personal details to the supermarket [2] b) Describe the steps the supermarket can take to reassure the customers about their concerns [5]					

`